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## STRATEGIC ADOPTION OF TECHNOLOGICAL INNOVATIONS ON COMPETITIVE ADVANTAGE OF COMMERCIAL BANKS IN KENYA

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### ABSTRACT

The current study sought to establish the relationship between strategic adoption of technological innovations and competitive advantage of commercial banks in Kenya. Specific objectives were to establish the influence of E-Money transfer technologies, telephone banking technologies, internet banking technology and internal controls on competitive advantage of Commercial Banks in Kenya. Theories adopted include: Resource-Based View Theory, Innovation diffusion theory, Competitive advantage theory and Disruptive Innovation Theory. The study design employed was descriptive research design. The target population comprised of 43 commercial banks operating in Kenya where the unit of analysis comprised of 1 Branch Manager, 1 Head of Customer Service, 1 Head of IT Support and 2 Relationship officers from each bank making a total of 215 respondents. The primary data collection instruments used was a semi-structured questionnaire containing both closed and open-ended questions and issued to 215 study population respondents. The collected data was analyzed by employing both inferential analysis and descriptive statistics using Statistical Package for Social Science (SPSS) V25 and Microsoft Excel. A random pilot study carried on 21 respondents was done to assess the data collection instrument on validity and reliability. Out of the issued 215 questionnaires to the respondents, 192 were completed and successfully returned. This equates to 89.3% response rate, an appropriate for conducting analysis and making inferences. Tables and figure formats were used in presenting the study results and findings. The study findings were that the adoption of innovative technologies (E-Money transfer, Telephone banking, Internet banking and, Internal controls) had positive and significant influence on competitive advantage of Commercial banks in Kenya. The study recommended the use of credit cards to make online transactions like Cardless payments to improve access to financial services, Commercial banks to consider adapting mobile-based innovative Fintech to increase overall reach of the banking services to the populace, commercial banks to incorporate automated alert systems in case of theft at the ATMs and finally, appropriate systems authenticating user identity be put in place in remote areas to enhance security and increase user confidence in using internet technologies.

**Key Words:** *E-Money Transfer Technologies, Telephone Banking Technologies, Internet Banking Technology, Internal Controls and Competitive Advantage*

### **Background of the Study**

The 21st century saw the emergence of technological innovations that significantly transformed the way banks operate (Zhao, Tsai, & Wang, 2019). With the impact of globalization, the business world continues to receive important innovations and advancements, which are swiftly transforming the way banking institutions operate. Banking institutions worldwide have implemented the new innovations into their business operations as a mean towards, attaining competitive advantage. (Oke & Goffin, 2019), indicate that developed nations of Europe and United States have successfully embraced technological innovations for over the last five decades to improve the institutional internal operations, and as approach for organizational development and growth. With this regard, business organizations which remains in the market and profitable have to effectively utilize their resources well (Davila, Epstein & Stretton, 2010), by embracing the technological innovations as a changing agent. Magotra, Sharma and Sharma (2018) add that technological innovation is considered as a new process, product, and service that are introduced and embraced due to change in the technology.

Zhao, Tsai, & Wang, (2019) defined technology innovation as a new scientific method that illustrate the nature and rate of trend in the technology. Ombati *et al.*, (2017) indicate that the idea of technological innovation was as a result of theoretical school of thought that was seen as the innovation systems method. Newbert in his definition, describes competitive advantage as the degree to which a firm discovers the available opportunities, neutralizes threats and reduces its cost (Newbert, G and Ma N, 2017). Porter (1996) notes that the competitive strategies that differentiates a particular firm from its competitors is the determinant of such a business survival. On the other hand, Sharm and Rugman (2018) asserts that a firm that is capable of designing, producing and marketing its products or services in the market far better than its competitors, is considered more competitive. All these market dynamics are indications that none of the industry players can ever refuse to technologically innovate (Hurley and Hult, 2018). This explains the role that technological innovations play in making organizations have competitive advantages over their rival competitors in a competitive market. Emerging as one of the strategies firms adopt to remain competitive, there exists disparities by various research works on the contribution of technological innovation on the performance of Commercial banks.

### **Statement of the Problem**

Banking institutions have implemented new innovations into their business operations as a mean to attaining competitive advantage. The innovations have enabled most of the financial institutions to introduce new systems, products and services so as to automate different interfaces of internal operations, thus cutting the overhead expenses, and improving performance. There has been a recent upsurge in uptake of financial services in Kenya, more people are using formal services for keeping their money. However, given the stiff competition from the mobile phone operators that also offer efficient money transfer, quick loans and more convenient means of saving money, banks have been negatively affected (Lorenz & Pommet, 2020; Kipchumba & Sulaiman, 2020). That creates another form of competition where banks do not only compete amongst themselves for customers but also with the mobile service providers (Koomson, Bukari & Villano, 2019). As a result, banks soften the processes of opening an account, accessing funds, transferring them and saving them by fusing their operations with the mobile service providers. Whereas that served the purpose of having more people embracing former banking, it also led to upsurge in the number of

persons seeking financial services. The reports from Central Banks of Kenya indicated a significant increase in the proportions of Kenya with access to banking and formal financial services that show an increase from 75.3% in 2016 to 82.9% in 2019, meaning that 89% can access any form of financial products/services (FINACCESS, & Central Bank of Kenya, 2019). This increase in the bank's operations and services significantly placed a considerable burden on the Bank's internal and external operations, in terms of efficiency, effectiveness, planning, quality of work and staffing across the Banks' geographical locations (Crytonn, 2016). However, with the current trend in the increase in the numbers, there is need for improvement in terms of operational management to have products and services needed by the customers to attain competitive advantage (Zhao *et al.*, 2019). Banks do not have the capacity and resources to have branches or extend services to parts of the country but can leverage on the existing technologies, notably, mobile technologies to bring banking services closer to the customers (Houenou & Djogbenou, 2020; Mugo & Ngugi, 2021; Bochaberi & Job, 2021). With the adoption of such technologies, banks opened up another frontier of competition where banks that have embraced the disruptive effects of technological innovation are believed to have a competitive edge over others (Muchemi & Moronge, 2019). But beyond competition, there are other factors that may be the contributors toward establishing a competitive edge. The links between technological innovations as a strategy and competitive advantage of commercial banks in Kenya remains very shallow with little presentation to the banking institutions (Nzioka & Kariuki, 2021; Waithaka, 2020). As a result, this study has been designed to expand on the existing studies on technology innovation in banking sector, and fill the gap in the literatures on the relationships between the technological innovations on a bank's competitive advantage.

### **General Objective**

The study aimed at determining the relationship between the technological innovation and competitive advantage of Commercial Banks in Kenya.

### **Objectives of the Study**

- i. To establish the influence of E-Money transfer technologies on the operations of Commercial Banks in Kenya
- ii. To determine how telephone banking technologies have influenced the operations of Commercial Banks in Kenya.
- iii. To evaluate the influence of internet banking technology on financial performance of Commercial Banks in Kenya.
- iv. To determine the effect of internal controls on the competitiveness of Commercial Banks in Kenya.

### **Research Questions**

- i. To what extent has E-Money transfer technologies influenced competitive advantage of Commercial Banks in Kenya?
- ii. How has telephone banking technologies influenced competitive advantage of Commercial Banks in Kenya?
- iii. To what extent has internet banking technology influenced competitive advantage of Commercial Banks in Kenya?

- iv. To what extent has internal controls influenced the financial performance of Commercial Banks in Kenya?

## LITERATURE REVIEW

### Theoretical Review

#### Resource-Based View Theory

Penrose (1959) laid a foundation for this Resource-Based View Theory (RBV) and outlined how a given organization can fully utilize the available resources to become competitive and gain advantage over its rivals offering similar services (Barney & Clark, 2013). The theory views a firm as constituting of several resources that may be tangible or soft, whose proper use accords it a competitive advantage over organizations handling similar businesses. The theory also postulates that these firm resources are not perfectly mobile and are also not uniform but rather customized or adapted for the purposes of serving the interests of the firm that uses the resources (Mills, Platts & Bourne, 2017). These resources are often considered heterogeneous as those possessed by a given firm and the strategies formulated to utilize them in realizing the intended objectives are often considered idiosyncratic. They are not mobile simply because the organization may not be in position to dispose them off to the market for gaining value. Pettus (2016) asserts that a firm should fully utilize its available resource in their scarce nature to drive competitive advantage that their rival competitors adore to imitate. The Resource-Based View Theory (RBV) aligns with the study as it highlights the significance of resources to an organization and how such should be maximized should the organization seek to achieve competitive advantage in the market. The study supports innovation as being central to the process of strategic adoption of technologies for efficient running of the operations of an organization.

#### Diffusion of Innovation Theory

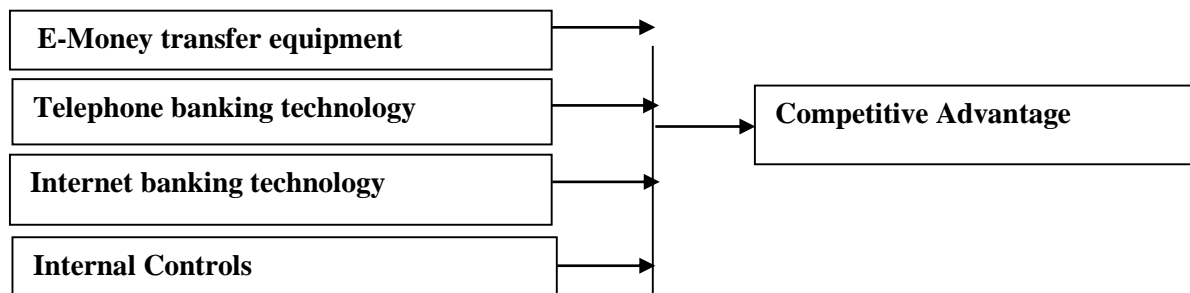
The innovation diffusion theory identifies trial-ability, compatibility, relative advantage, observability and complexity as five tenets of innovation. The theory postulates that relative advantage helps in establishing the role played by technology in providing the necessary tools to aid innovation (Bernstein, 1994). Compatibility is the level at which the different norms and practices of an organization are consistent with an innovation and to the users of the adopted technology (Goffin, 2019). The aspect of complexity identifies the level at which the adopted technology is easy to be adopted for improving production. Observability however, refers to the overall degree at which the overall outputs or gains of the adopted technology are vivid for realization of the intended objectives (Rogers, 2018). The process of adopting new technologies is thus a factor of compatibility as well as relative advantage over the other technologies that may be in existence. Nevertheless, the level of performance of innovations is hugely determined by the perceptions of the adopters as well as the structure of the organization (Rukangu, 2016). These adopters are often classified based on their speed of adoption to the new technologies, for instance, laggards, early adopters, later majority, early majority and innovators (Rogers, 1995). The Innovation Diffusion Theory has a vital effect to the study because it informs the independent variables and how the financial institutions can be able to identify technologies for product/service differentiation in a competitive market.

### **Porter's Theory of Competitive advantage**

The theory of competitive advantage as propounded by Porter identifies that competitive responses exist in any given dynamic business environment (Porter, 1980). The theory contends that the business environment is responsible for generation of the competitive pressures that are experienced overall by the different business firms (Rahayu & Wibowo, 2020). The overall rules in the business game are dictated by the industry structures in which a given business operates. Porter developed a model with five forces that are believed to be operating within a given industry. These include; barrier to entry of new players, rivalry among existing competitors in the market, bargaining power of the buyers, bargaining power of the suppliers and threats from substitute products in the market. These forces together play a significant role in influencing the competition in any given industry (Smit, 2017). The Porter's model is vital in helping an organization to not only gain competitive advantage but also to survive the market despite the competitive forces that exist. The model also possesses varying assumptions regarding the strategies and the sources of competition in the industry (Bundi, 2018). It also enables firms in a competitive market to properly analyze how the competitive forces operate in order to get the best way of dealing with these forces to gain any competitive advantage in the market (Kronick, 2019). Porter's Theory is crucial for the study as it helps to showcase the unique value that each innovation in the Kenya banking sector, and how players can adopt to such new innovations to gain a competitive edge.

### **Disruptive Innovation Theory**

Clayton M. Christensen, Harvard professor in 1997, coined the theory and explains through his book *The Innovator's Dilemma*, how existing market or sector tend to fail as a result of disruptive technologies (Christensen & Raynor, 2003). This theory highlights a process where small or new firms with fewer resources use disruptive technologies to challenge existing firms (Christensen & Raynor, 2003). The theory notes that a well-managed organization with good managers risk losing their space in the industry when they ignore their rivals with disruptive innovations when they do the same things, expecting to succeed and remain competitive. Danneels (2014) defines Disruptive Innovation as a concept, product or a service that either disrupts an existing market or creates a completely new market segment. The theory elaborates a concept by which a complicated and high cost oriented sector or an existing market is transformed by an innovation through an introduction of a simpler, convenience, accessible and affordable product or idea that redefines an industry. Disruptive innovations help create new markets and networks when products and services features are improved to persuade not only new customers but also, presents affordable prices that existing customers find more convincing and convenient to continue using the product – a competitive pattern (Christensen, 2015). This narration provides a window of how technological innovation can be applied by the commercial banks in Kenya to exploit a competitive market and remain at the top (Gitau, 2018). This theory thus validates how various commercial banks in Kenya continue to nurture technological innovations, Research and Development Department in exploring new ideas that conquers the untapped markets and embed them into the system to solidify market base.

**Conceptual Framework****Independent variables****Dependent Variable****Figure 1: Conceptual Framework****Empirical Review****Competitive strategies in the financial institutions**

A review of study by David (2017) conducted to determine the effects of focus and cost leadership strategies on the performance of banks. The outcome of their study reveal that competitive strategies indeed have an effect on the overall performance of commercial banks. Again, Kungu, Desta & Ngui (2014) hold that Kenya's commercial banks are continuously facing severe competition that necessitate designing appropriate competitive strategies that can guarantee their effective performance and edge over other banks. They further stated that such banks have to insightfully enter a market, establish and protect a competitive position. The findings of their study reveal that commercial banks employ varied competitive strategies that include a combination of; focus strategy, combinations strategy, differentiation and cost leadership as the major competitive strategies in commercial banks. They also noted that the sources of competition in commercial banks were largely external and that the banks possess several strengths that enable it survive and favorably compete with other players. Kungu, Desta & Ngui (2014) further established a positive and significant relationship between competitive strategy effectiveness, customer focus, innovation and benchmarking on differentiation. Ndung'u, Otieno & Rotich (2016) further identified that competitive strategies enable firms to survive in fierce competitive operating environments. They conducted a study to establish cost leadership, focus, innovation, differentiation and capabilities of an organization affects performance in banks. Their findings revealed that the adopted competitive strategies by banks have a profound effect on the overall financial performance. Through collaboration with other organizations, commercial banks have been able to increase the overall uptake of its products as it continues to invest in innovative technologies that have enabled it maintain a very strong image and brand identification. From their study, Ndung'u, Otieno & Rotich (2016) recommended that commercial banks in Kenya need to collaborate more in order to further raise the overall consumption of their products but with special focus on development of skills and innovation.

**Technological Innovations on Competitive Advantage**

Cherotich et.al. (2018) states that the banking system in Kenya has also been left out in regards to financial and technological innovations. They postulate that the major driver to financial technological innovations would be the globalization of financial systems in banking sector, advances in technology and a need to deregulate. Their study concludes that there is need for

information on financial innovation to be readily available especially for the regulatory and advisory bodies so that they can properly guide commercial banks on how to employ better technological solutions/innovations for improved financial performance. Cherotich et.al. (2018) in his remarks, notes that firms need to create an environment that is enabling for their staffs to be innovative in their operations if they are to remain competitive as that was discovered to enhance their financial performance and sectoral growth. Sumiyu (2013) further states that innovation involves acting in response to creative ideas so as to make tangible and specific difference in that domain where innovation is meant to occur. They define innovation as an institution's ability to successfully implement creative ideas for the benefit of their continued growth. Sumiyu (2013) found a positive influence of the technology-driven innovations on banks performance in Kenya. The study posits that commercial banks in Kenya need to ensure that their staff are properly trained and knowledgeable regarding the industry best skills and practices. Firms also need to do periodic evaluations of the adopted practices to identify areas of improvement.

A study by Wachira (2013) on how technological innovations affects the overall performance of the same industry, noted an increased access, user friendliness and convenience in accessing the bank services. Furthermore, the study findings also reveal a positive relationship between the performances of banks as the overall profitability as a result of adopting technological innovations. Wachira (2013) thus revealed that the effect of combining the technological solutions, customer transparent technology and customer assisted technology had an overall strong positive effect on profitability and also explained more than 50% of the overall variation in performance. Similar study carried out by Muigai & Gitau (2018) and whose findings revealed a positive impact on the overall financial performance, recommended that Kenya banking industry should introduce new products/services, strive to improve the existing products to boost their overall financial performance. Furthermore, the study recommends that in order to further gain competitive advantage, the financial institutions need to offer a wider array of products compared to the other plays in the market. Other studies on the performance of the deposit-taking SACCOs in the County of Kajiado by Nekesa & Olweny (2018) established that, process innovation and products of the organization were great influencers of the deposit-taking SACCOs that were studied in the County of Kajiado. The study thus suggested that the Government has to mediate the adoption of innovative technologies by enacting legislation that would protect the savings of members and also promote prudential supervision of the banking industry.

### **Electronic Banking Influences on Performance**

A review of the study by Ngari & Muiruri (2014) argued that the banking industry in Kenya has undergone through evolution in its last 10 years to adopt financial innovations. That has fostered the migration of the traditional banking practices to modern practices that meet the ever growing complex customer needs across the globe. Ngari & Muiruri (2014) further state that despite the glaring importance and significance of financial innovation and extensive literature on the same, the studies that have been conducted on the use of electronic technological innovation on banking are still few. Such inadequate information means that the banks do not have enough empirical evidence for adoption of the much needed financial innovations. Gathungu (2018) investigated the utilization of e-banking financial technologies as strategic approach used to approve the performance of banks and other financial institutions in Kenya. They specifically investigated how mobile banking, the use of automated teller machines and internet banking can have the



profitability of financial institutions. Adopting a descriptive survey design, the findings of their study reveal that banks registered a positive growth in their overall profitability upon adopting these e-banking financial technologies. They however, noted that using mobile banking on the profitability of the banks had greater effect than one registered by using internet banking. Gathungu (2018) explains that such a result could be due to the large penetration of mobile telephones amongst Kenyans and the decision to use M-Pesa platform to facilitate the mobile payment was creditable because most Kenyans use M-Pesa. The study thus recommends that financial institutions among them banks, are poised to gain more in terms of performance and profitability, and gaining a competitive edge if they adopt the use of mobile banking financial technologies.

### **Telephone Banking on Operations**

Chiteli (2013) highlights that a competitive strategy involves searching for favorable competitive positioning in the whole industry. It is directly linked to how a given company gains advantage through product/service distinction while competing. Through competition, companies establish profitable positions against the forces that play a role in determining the completion in the industry. Chiteli (2013) investigated how agent banking affects the operations of commercial banks in Kisumu when used as a competitive strategy. A remarkable response validated the findings that indeed banks expanded their geographical scope which also reduced the long queues at the banking halls that were being experienced prior to introduction of agent banking. The study suggested as a strategy, the need for tighter internal control systems that are flexible which should be periodically evaluated for an effective agent banking operations. Sharma (2017) notes that the policies and procedures in the Kenya Bankers' association have to be periodically updated. Additionally, there should be frequent audits on the bank system as well as automation process on a quarterly basis so as to identify any loopholes that need to be addressed. Training of the Agents and their staff on the operation of the agent banking to be considered as well to upskill and empower them (Sharma, 2017). A research study by Gathee (2018) on how electronic banking, mobile banking and process innovation influence the operations of banks in Kenya, discovered that although electronic funds transfers, point of sale banking had an impact on operational management of banks, that result was not enough in explaining operational management. The results further show that the introduction of mobile credit financial innovations had a significant relationship with customer process innovations. The study thus concludes that inasmuch as the electronic innovation technologies had no effect on operational management, the ATM and POS technologies had a positive influence on the effectiveness and efficiency of commercial banks. Gathee (2018) thus concludes that process innovations and credit process transactions are important in enhancing operational management and efficiency of commercial banks. They can help the banks reduce on the overall operational costs.

### **Internet Banking on Financial Performance**

Ndungu, Njati & Rukangu (2016) discovered that financial performance of the banks in Meru were significantly influenced by the use and adoption of innovative financial technologies. They also noted that there were increased returns to the shareholders when the firms adopted innovative technologies. The study thus recommends that the banks have the ability to manage the operational costs by investing in the use of innovative technologies and could enjoy a better competitive advantage over those that do not use these technologies. The internet and mobile channels were

noted as having the ability to process larger volumes of transactions as compared to the conventional manual means of handling the processes (Rukangu, 2016). Wasilwa & Omwenga (2016) also sought a similar study of investigating the use of ICT strategies in the ATMS, internet banking and mobile banking. The studies were based on how they affect Banks' performance in areas of cash deposits, effectiveness and profitability. Results reveal that these technologies had an absolute positive impact on the overall performance of the financial institutions in Kenya. The recommendations of the study were that improving the operations of commercial banks required the adoption of agency banking, credit guarantees and securitization. Mobile and internet banking technologies were also noted to improve the efficiency of commercial banks and accorded them a competitive edge (Kihara, S. N, 2015).

### Internal Control

Wong (2014) on the effective internal network with intense knowledge, notes that members of the team are densely connected to one another and may result into firm competitiveness and survival. Hansen (2015) on the other hand, alludes that a stable internal network supports collaboration among the team members which in turn, motivates the members to performance higher. In addition, it has a positive relationship with the performance as customer engagements are assured on confidence and timely feedback (Keller, 2015).

Drawing on Ritter's (2010) network perspective on the network of relationships in operations of a firm, she asserts that an organization's core competence and source of competitive advantage emanates from its ability to develop and manage successful relationships with other players (Keller, 2015). According to Rother (2016), the banking network in commercial Banks in Kenya operates through the branches and Agents whose growth population expanded their customer base, leading to increased consumptions of banks products and services.

Al-Shbiel & Al-Olimat, (2019), asserts that banking institutions have welcomed and implemented new innovations into their business operations as a means of attaining competitive advantage. The innovations have enabled most of the financial institutions to introduce new systems so as to automate different interfaces of internal operations, thus cutting the overhead expenses, and improving performance (Joseph, 2018). The evolution of customer-bank relationship has necessitated a more customer-centric by the banks in meeting their customer experience expectations (Joseph, 2018). Internal network is thus seen as a strategic means of attaining competitive advantage.

### Research Methodology

The study adopted a descriptive design and study population comprised of 215 respondents from branches of commercial banks in Nairobi. A total of 43 branches of Commercial Banks in Nairobi County. The study relied on primary data and data collection instruments used a semi-structured 5-point likert scale questionnaire. Inferential and descriptive statistics was used to analyze data. Results of the analysis were presented by use of tables and figures. Inferential statistics was used to establish the association between independent variables and dependent variable. The study used the following regression model:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where, Y = Competitive Advantage,  $X_1$  = E-Money Transfer Equipment,  $X_2$  = Telephone Banking Technology,  $X_3$  = Internet Banking Technology,  $X_4$  = Internal Network,  $\varepsilon$  = Error term,  $\beta_0$  =

Regression constant or intercept. From the formula, Y is determined by the changes in  $X_1$ ,  $X_2$ ,  $X_3$  and  $X_4$ .  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$  and  $\beta_4$  are the unknown coefficients of independent variables in which a change of X influences Y.

## Results

A total of 215 questionnaires were administered and the survey collected 192 of the 215 respondents within the County of Nairobi. The overall response rate was 89.3%, appropriate for conducting analysis and making inferences. With the drop and pick data collection technique, interviewees were given sufficient time to respond to questionnaires hence high response.

## Descriptive Findings and Analysis

### Descriptive Statistics

The researcher adopted Descriptive statistics in the study to describe the distribution of measures of the indicator variables. Both means and standard deviation were equally used as the descriptive statistics in the current study. Using semi-structured questionnaire as data collection instrument, the researcher used a scale of 1 -5 to rate responses where the scale 1- Strongly Disagree at all, 2 - Disagree, 3 - Moderate, 4 - Agree and, 5 - Strongly Agree.

### E-Money transfer technologies

The study investigates the influence of E-Money transfer technologies on competitive advantage of the commercial Banks in Kenya. Respondents were presented with statements on E-Money transfer technologies and were requested to rate their levels of agreement in a 5-point Likert scale where 1=Strongly Disagree, 2=Disagree, 3=Moderate, 4=Agree and 5=Strongly Agree. The study results summarized in table 1 indicate that the respondents agreed with the statements that their bank has sufficient ATMs machines countrywide, mean=4.45, that the ATM machines are easily accessible to our customers, mean=4.59, that the bank ensures the ATMs are always loaded to ensure continuity in cash withdrawals and deposits by our customers, mean=4.46 and that the bank provides both credit and debit cards to our customers, mean=4.40. The respondents were further in agreement with the statements that the cards eliminates the needs of customers carrying cash thus enhancing the levels of security, mean=4.52, that the bank provides customers with E-cheques services, mean=4.51 and that adoption of e-money transfer services has placed our bank in a more competitive position, mean=4.40. An overall mean of 4.48 implied that respondents agreed with the statement on E-Money technologies adopted by Commercial Banks. This is in consistent with the findings of Orbeta (2017) that E-Money technologies offers a more convenient and secure way of living due their convenience and accessibilities.

**Table 1: E-Money transfer equipment**

Parameter	Count	Strongly Disagree	Disagree	Moderate	Agree	Strongly Agree	Mean
Our bank has sufficient ATMs machines countrywide	192	-	-	5.0%	45.3%	49.7%	4.45
The ATM machines are easily accessible to our customers	192	-	-	2.8%	35.2%	62.0%	4.59
Our bank ensure that our ATMs are always loaded to ensure continuity in cash withdrawals and deposits by our customers	192	-	-	8.5%	36.9%	53.6%	4.46
Our bank provides both credit and debit cards to our customers	192	-	0.6%	10.1%	37.6%	51.7%	4.40
The cards eliminates the needs of customers carrying cash thus enhancing the levels of security	192	-	-	3%	41%	55%	4.52
Our bank provides customers with E-cheques services	192	-	-	6%	36%	57%	4.51
Adoption of e-money transfer services has placed our bank in a more competitive position	192	-	-	12%	36%	52%	4.40
Overall Mean score = <b>4.48</b>							
Standard Deviation = <b>0.619</b>							

### Telephone banking technologies

The study further investigated the influence of Telephone banking technologies on competitive advantage of the commercial Banks in Kenya. Respondents were presented with statements on Telephone banking technologies and were requested to rate their levels of agreement in a 5-point Likert scale where-1=Strongly Disagree, 2=Disagree, 3=Moderate, 4=Agree and 5=Strongly Agree. The study results summarized in table 2 indicate that the respondents agreed with the statements that their bank has established USSD services for customers to query their bank account balances, mean=4.61, that the USSD service is simplified for ease of use to all customers, mean=4.52, that the bank has established agency banking where customers can access majority of our banking services, mean=4.58 and that through agency banking, our bank has simplified means of serving our customers, mean=4.31. Respondents further agreed with the statements that through agency banking, the bank has managed to reduce the number of customers visiting the branches of the bank, mean=4.25, that the bank has a pay-bill service to enable customers pay their bills directly from their bank account, mean=4.36 and that the pay-bill services creates operational convenience to our customers, mean=4.49. An overall mean of 4.45 implied that respondents agreed with the statement on E-Money technologies adopted by Commercial Banks. The study results affirms Mithika & Liu (2018) findings that telephone banking technologies are efficient, accessible, secure, user friendly and affordable means of performing financial transactions.

**Table 2: Telephone banking technology (Wired and wireless services)**

Parameter	Count	Strongly Disagree	Disagree	Moderate	Agree	Strongly Agree	Mean
Our bank has established USSD services for customers to query their bank account balances	192	-	-	4.50%	30.20%	65.40%	4.61
The USSD service is simplified for ease of use to all customers	192	-	-	6.70%	34.60%	58.70%	4.52
Our bank has established agency banking where customers can access majority of our banking services	192	-	-	5.60%	30.70%	63.70%	4.58
Through agency banking, our bank has simplified means of serving our customers	192	-	-		26.70%	73.30%	4.31
Through agency banking, the bank has managed to reduce the number of customers visiting the branches of the bank	192	-	-		29.60%	70.40%	4.25
The bank has a pay-bill service to enable customers pay their bills directly from their bank account	192	-	-		24.70%	75.30%	4.36
The pay-bill services creates operational convenience to our customers	192	-	0.60%	5.60%	38.00%	55.90%	4.49
Overall Mean score = <b>4.45</b>							
Standard Deviation = <b>0.616</b>							

### Internet banking technology

The study also investigated the influence of Internet banking technology on competitive advantage of the commercial Banks in Kenya. Respondents were presented with statements on Internet banking technology and were requested to rate their levels of agreement in a 5-point Likert scale where-1=Strongly Disagree, 2=Disagree, 3=Moderate, 4=Agree and 5=Strongly Agree. The study results summarized in table 3 established that respondents were agreement with the statements that their bank has a mobile banking app accessible to our customers, mean=4.49, that the mobile banking app enable customers to access banking services through the phone, mean=4.69, that their bank has an established web-based banking platform for customers, mean=4.46 and that there is a one-on-one interaction between customers and the bank through the web platform, mean=4.51. Consequently, the study established that there is ease of use of the platform by customers while conducting financial transactions, mean=4.59, that through internet banking, there is an enhanced customer confidence with banks, mean=4.46 and that there is high reliability of the internet banking in accessing financial services, mean=4.57. An overall mean of 4.54 implied that respondents agreed with the statement Internet banking technology adopted by Commercial Banks. The results are consistent with Mgbemena(2015) findings that with internet banking technologies, customers are offered additional ubiquitous and diverse banking technology that allows easy access including in areas that do not support mobile gadgets. With proliferation of such

technologies, the customers have more opportunities of carrying out online transactions like purchase of online goods and services or even converting the money to digital currencies with ease.

**Table 3: Internet banking technology**

Parameter	Count	Strongly Disagree	Disagree	Moderate	Agree	Strongly Agree	Mean
Our bank has a mobile banking app accessible to our customers	192	-	1.1%	9.5%	29.1%	60.3%	4.49
The mobile banking app enable customers to access banking services through the phone	192	-	-	1.1%	28.5%	70.4%	4.69
Our bank has an established web-based banking platform for customers	192	-	-	1.7%	50.6%	47.8%	4.46
There is a one-on-one interaction between customers and the bank through the web platform	192	-	0.6%	6.7%	33.5%	59.2%	4.51
There is ease of use of the platform by customers while conducting financial transactions	192	-	0.6%	3.4%	33.0%	63.1%	4.59
Through internet banking, there is an enhanced customer confidence with our bank	192	-	0.6%	6.7%	39.1%	53.6%	4.46
There is high reliability of the internet banking in accessing financial services	192	-	2.8%	3.9%	26.8%	66.5%	4.57
Overall Mean score = <b>4.54</b>							
Standard Deviation = <b>0.618</b>							

### Internal Controls

The study also investigated the influence of Internal Controls on competitive advantage of the commercial Banks in Kenya. Respondents were presented with statements on Internal Controls and were requested to rate their levels of agreement in a 5-point Likert scale where-1=Strongly Disagree, 2=Disagree, 3=Moderate, 4=Agree and 5=Strongly Agree. The study results summarized in table 4 established that respondents were agreement with the statements that in their respective commercial bank, there is a routine assessment of risks associated with technological innovations, mean=4.35, that banks promptly addresses any prevailing and potential risks surrounding our banking innovations, mean=4.54, that banks has established a control environment to counter any threat associated with our banking innovations, mean=4.49 and that the control environment detects threats and provides prompt solutions, mean=4.52.

The results further revealed that commercial banks monitors all online banking activities through a centralized monitoring center, mean=4.44, that the monitoring practices ensures the bank detects the slightest threat in the innovations, mean=4.47 and that having secured banking innovations increases our bank's confidence with customers, mean=4.64. . An overall mean of 4.49 implied that respondents agreed with the statement Internal Controls adopted by Commercial Banks. The use of Fintech improves the overall efficiency, accessibility of convenience financial services (Gathee, 2018). However, the customers and bank systems are prone to cyber-attacks that may greatly lead to loss of money both to the customers and the banks. As such, banks have developed some infrastructural systems that would offer security to the customers (Chiteli, 2013). These vary greatly from the use of alarms, notifications, restricted access, biometric scans and a number of other security measures.

**Table 4: Internal Controls**

Parameter	Count	Strongly Disagree	Disagree	Moderate	Agree	Strongly Agree	Mean
There is a routine assessment of risks associated with technological innovations in our bank	192	-	0.6%	11.7%	40.2%	47.5%	4.35
Our bank promptly addresses any prevailing and potential risks surrounding our banking innovations	192	-	0.6%	9.5%	25.7%	64.2%	4.54
Our bank has established a control environment to counter any threat associated with our banking innovations	192	-		3.4%	44.7%	52.0%	4.49
The control environment detects threats and provides prompt solutions	192	-	5.6%	36.9%	57.5%	100.0%	4.52
Our bank monitors all online banking activities through a centralized monitoring centre	192	-		7.8%	40.8%	51.4%	4.44
The monitoring practices ensures the bank detects the slightest threat in the innovations	192	-	0.6%	5.6%	40.2%	53.6%	4.47
Having secured banking innovations increases our bank's confidence with customers	192	-		3.9%	28.5%	67.6%	4.64
Overall Mean score = <b>4.49</b>							
Standard Deviation = <b>0.621</b>							

### Competitive Advantage of Commercial Banks

Respondents were presented with statements on competitive advantage of commercial banks as a result of adoption of strategic technological innovations and were requested to rate their levels of agreement in a 5-point Likert scale where-1=Strongly Disagree, 2=Disagree, 3=Moderate, 4=Agree and 5=Strongly Agree. The study results summarized in table 5 shows that as a result of adopting strategic technological innovations, commercial banks had recorded increased level of profits, mean=4.61, witnessed an increase in the levels of market share, mean=4.59, and recorded an increase in the number of customers in our bank, mean=4.61. Similarly, commercial banks have managed to retain old customers while attracting new ones, mean=4.72, have recorded an increased competitive niche in all our products and services, mean=4.62 and that their customers'

Net Promoter Score had shown an upward trend, mean=4.60. An overall mean of 4.63 implied that respondents agreed with statement on competitive advantage of commercial banks as a result of strategic technological innovations. The result resonates well with the Kungu, Desta & Ngui (2014) findings that banks are expected to develop strategies for countering competition as they possess several strengths that enable survival and favorable competition with other players. Equally, Ndung'u, Otieno & Rotich (2016) adds that competitive strategies enable firms to survive in fierce competitive operating environments and reveals that the adopted competitive strategies by banks have a profound effect on the overall financial performance.

**Table 5: Competitive Advantage of Commercial Banks**

Parameter	Count	Strongly Disagree	Disagree	Moderate	Agree	Strongly Agree	Mean
Our bank has recorded an increased level of profits	192		0.0%	0.6%	37.4%	62.0%	4.61
Our bank has witnessed an increase in the levels of market share	192		0.0%	1.1%	39.1%	59.8%	4.59
There is an increase in the number of customers in our bank	192		0.0%	3.4%	31.8%	64.8%	4.61
Our bank has managed to retain old customers while attracting new ones	192		0.0%	0.0%	27.9%	72.1%	4.72
Our bank has recorded an increased competitive niche in all our products and services	192		0.6%	1.1%	34.1%	64.2%	4.62
Our customers' Net Promoter Score has recorded an upward trend	192		0.0%	1.7%	36.9%	61.5%	4.60
Overall Mean score = <b>4.63</b> Standard Deviation = <b>0.502</b>							

## Inferential Statistics

### Correlation Analysis Results

The purpose of the correlation was to establish if any possible relationships between the dependent variable and the independent variable or between the independent variables exists. In this analysis, a correlation matrix was developed, Pearson correlation results were obtained and significance tested at 0.05 level. The correlation matrix in presents a collage of individual scatter plots between all the variables in the model. The Pearson correlation results in table 6 indicates that there a positive ( $r = 0.647$ ,  $P\text{-Value} = 001$ ) and significant correlation between competitive advantage and E-Money transfer technologies in the Kenyan Commercial banks. This is in consistent with the findings of Orbeta (2017) that E-Money technologies offers a more convenient and secure way of living due their convenience and accessibilities. With telephone banking technology, the correlation results indicate that there is a positive and significant ( $r = 0.69$ ,  $P\text{-Value} < 0.05$ ) correlation between competitive advantage and telephone banking technology in the Kenyan commercial banks. The study results affirms Mithika & Liu (2018) findings that telephone banking



technologies are efficient, accessible, secure, user friendly and affordable means of performing financial transactions.

Competitive advantage has a weak but significant correlation ( $r = 0.693$ ,  $P\text{-Value} < 0.05$ ) with Internet Banking Technology. The results are consistent with Mgbemena(2015) findings that with internet banking technologies, customers are offered additional ubiquitous and diverse banking technology that allows easy access including in areas that do not support mobile gadgets. With Internal controls, competitive advantage has a moderate and significant correlation ( $r = 0.548$ ,  $P\text{-value} < 0.05$ ). Without implying causality, the relationship between competitive advantages implies an improvement in the internal controls is associated with an increase in the competitive advantage of a given commercial bank. The Pearson correlation statistics across the independent variables in the model indicate that there is significantly strong correlation between given pairs.

**Table 6: Correlation results of the variables**

		<b>E-Money Transfer Technology</b>	<b>Telephone Banking Technology</b>	<b>Internet Banking Technology</b>	<b>Internal Controls</b>	<b>Competitive Advantage</b>
E-Money Transfer Equipment	Pearson Correlation Sig. (2-tailed)	1				
Telephone Banking Technology	Pearson Correlation Sig. (2-tailed)	.83**	1			
Internet Banking Technology	Pearson Correlation Sig. (2-tailed)	.771**	.63**	1		
Internal Controls	Pearson Correlation Sig. (2-tailed)	.75**	.97**	.548**	1	
Competitive Advantage	Pearson Correlation Sig. (2-tailed)	.647**	.690**	.693**	.793**	1
	N	192	192	192	192	192

### Multiple Regression Analysis

A multiple regression analysis was conducted in the study to assess the level of relationships between the combined independent variables (E-Money transfer technologies, Telephone banking technologies, Internet banking technology and Internal Controls) and the dependent variable (competitive advantage of commercial banks). The model summary shows the degrees of relationship between the independent variables and the dependent variable. The results outlined in table 7 shows that the R-value was 0.525 implying existence of moderate relationship between the independent variables and the dependent variable. The R-Square value was 0.276 implying that 27.6% of variations in the competitive advantage of commercial banks can be accounted by E-Money transfer technologies, Telephone banking technologies, Internet banking technology and Internal Controls.

**Table 7 Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.525 <sup>a</sup>	.276	.234	.0421851

a. Predictors: (Constant), E-Money Transfer Technology, Telephone Banking Technology, Internet Banking Technology and Internal Controls

The results of Analysis of Variance(ANOVA) outlined in table 8 shows that the model linking strategic technological innovations and competitive advantage statistically significant. This is shown by sig value of 0.000 which is less than 0.05. Thus the model is a good fit for the study and can be used to assess the relationship between the variables of the study.

**Table 8: ANOVA**

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	<b>Regression</b>	1.794	4	.4485	17.85977	.000b
	<b>Residual</b>	4.696	187	.02511		
	<b>Total</b>	<b>6.489</b>	<b>191</b>			

a. Dependent Variable: Competitive Advantage

b. Predictors: (Constant), E-Money Transfer Technology, Telephone Banking Technology, Internet Banking Technology and Internal Controls

Table 9 outlines the coefficients of the model. The results of the regression indicate that there is a positive and significant influence of E-Money Transfer technologies on competitive advantage of commercial banks (Beta = 0.062, P-value = 0.0263). The implication is that a unit improvement in the use of E-Money Transfer Technology would lead to a 6.2% of a unit's increase in competitive advantage. The results concurs with Gathungu (2018) who revealed that banks registered a positive growth in their overall profitability upon adopting these e-banking financial technologies. Telephone Banking Technology positively and significantly influence competitive advantage of commercial (Beta = 0.054, P-value = 0.0229). The results implies that when Telephone Banking Technology is increased with one unit, competitive advantage of commercial banks would increase by 5.4% units. The regression results further revealed that Internet Banking Technology bears a positive and significant influence on Competitive Advantage (Beta=0.126, P-value = 0.009). The results bears implications that increasing Internet banking technologies with one unit would improve competitive advantage by 12.6%. The results tallies with Ndunga, Njati and Rukangu (2016) findings that that financial performance of the commercial banks in was significantly influenced by the use and adoption of innovative financial technologies. The results of the study indicated existence of a positive and significant influence of Internal controls on competitive advantage of commercial banks (Beta = 0.29, P-value < 0.05). The results implies that increasing aspects of in internal controls with one unit results to 29% unit increase in competitive advantage of commercial banks. The results matches with Al-Shbiel & Al-Olimat, (2019) who asserts that

banking institutions have welcomed and implemented new innovations into their business operations as a means of attaining competitive advantage.

**Table 9: Model Coefficients**

Variables	Unstandardized Coefficients		t	P-Value
	B	Std. Error		
(Constant)	2.232	.345	6.465	.000
E-Money Transfer Technology	.062	.055	1.122	.0263
Telephone Banking Technology	.054	.045	1.208	.0229
Internet Banking Technology	.126	.064	1.964	.009
Internal Controls	.290	.060	4.801	.000

The optimal model becomes:

$$Y = 2.232 + 0.062X_1 + 0.054X_2 + 0.126X_3 + 0.290X_4$$

Where,

Y = Competitive Advantage; X<sub>1</sub> = E-Money Transfer Equipment; X<sub>2</sub> = Telephone Banking Technology; X<sub>3</sub> = Internet Banking Technology; X<sub>4</sub> = Internal Controls; β<sub>0</sub> = Regression constant or intercept.

### Conclusion

The study concluded that E-money transfer technologies bears a positive and significant influence on competitive advantage of commercial banks. Additionally, E-money transfer technologies aspects such as having sufficient and accessible ATMs machines countrywide, ensuring that the ATMs are always loaded to ensure continuity in cash withdrawals and deposits by our customers, providing both credit and debit cards to our customers which eliminates the needs of carrying cash and providing customers with E-cheques services further enhances the levels of competitive advantage of the commercial banks. The study also concluded that telephone banking technologies bears a positive and significant influence on competitive advantage of commercial banks. Remarkably, telephone banking technologies aspects such as establishing a simplified USSD services for customers, creating avenues where customers can access bank's financial services through agency banking, and having a paybill service that enables customers to conveniently pay their bills directly from their bank account services further enhances the levels of competitive advantage of the commercial banks.

The study further concluded that internet banking technologies bears a positive and significant influence on competitive advantage of commercial banks. Furthermore, internet banking technologies aspects such as establishing a mobile banking app where customers can access banking services through the phone, having a simplified bank web-based platform where customers can have a one-on-one interactions with the bank, ensuring the levels of confidence with the bank is enhanced through internet banking and increasing internet banking levels of reliability with customers further enhances the levels of competitive advantage of the commercial banks.

The study finally concluded that internal controls bears a positive and significant influence on competitive advantage of commercial banks. Furthermore, internal control aspects such as having a routine assessment of risks associated with technological innovations; promptly addressing any prevailing and potential risks surrounding banking innovations; establishing a control environment to counter any threat associated with banking innovations; having an environment that detects threats and provides prompt solutions and monitoring all online banking activities through a centralized monitoring centre further enhances the levels of competitive advantage of the commercial banks.

### **Research Recommendations**

The study proposes further customer sensitization by Commercial banks on the use of credit cards to make online transactions like cardless payments and improve access to financial services. Given the proliferation of mobile devices amongst Kenyans, Commercial banks need to explore options of adapting mobile-based innovative Fintech to increase overall reach of the banking services to the populace. The study also recommends that commercial banks consider setting up automated alert systems at the ATMs points to minimize or detects thefts. From the research, the study showed that internally, the staff at the banks had minimal information of the existing security measures set in place to protect users whenever they transact at the ATMs points. Finally, the study recommends that appropriate systems authenticating the identity of user be put in place in remote areas to enhance security of the users and increase their confidence in using internet technologies if assured of safety to their funds and personal data.

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